MIGRATORY BIRD DISEASE CONTINGENCY PLAN

BACK BAY NATIONAL WILDLIFE REFUGE
VIRGINIA BEACH, VIRGINIA

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I. INTRODUCTION

Back Bay National Wildlife Refuge was established in 1938 to provide habitat and protection for migratory birds. Management objectives have since been expanded to provide for a broader spectrum of wildlife, with special emphasis on waterfowl, shorebirds and threatened and endangered species; and to provide the visiting public with opportunities for wildlife oriented recreation and environmental education to the extent compatible with resource needs.

The refuge consists of approximately 7,800 acres located in the southeastern corner of the City of Virginia Beach in Virginia (Appendix Ia). In addition, about 4,600 acres of open bay water within the refuge boundary were closed to the taking of migratory birds by Presidential Proclamation in 1939. The refuge extends 4.2 miles along the Atlantic shoreline. About 800 acres of habitat consist of barrier beach and adjacent dunes with an elevation of about 20 feet. Marshland, predominately black needlerush, comprises about 3,850 acres or 77% of the refuge. This wetland acreage includes about 900 acres in 10 freshwater impoundments. Scattered woodlands, consisting primarily of loblolly pine with some live oak, red maple, persimmon and sweetgum, comprise about 250 acres. The remaining upland area includes 256 acres, which is comprised of both in grass, managed as grassland nesting and feeding areas for ducks and other migratory and nonmigratory birds (mainly neotropicals and other passerines and non-passerines), and crops (corn, soybean, and wheat), managed as feeding and resting areas for snow geese, Canada geese, and other migratory waterbirds, during the fall and spring migrations, and the winter. The Proclamation waters are shallow with an average depth of about 4.4 feet. Salinity ranges between 2-10% sea strength. Bay waters are not influenced by lunar tides but wind is a major factor. Persistent northerly winds may lower the water level as much as 1-2 feet; while persistent southerly winds have the opposite effect.

There has been one major disease outbreak on the Refuge. In February 1975, an outbreak of avian cholera caused the death of 18,000 wild waterfowl, primarily American coots (Fulica americana) on Back Bay. To arrest the outbreak, coots were treated with aerial applications of a wetting agent, rendered flightless, collected from the water, and humanly destroyed. The next two distinct disease outbreaks occurred in Mount Trashmore Lake of Virginia Beach in February 1990 and late spring-early summer 1991. The cause of the outbreak in 1990 was an oil spill. The spill was successfully prevented from spreading and cleaned up. Affected waterfowl were then collected and transported to an off-site incinerator at the Virginia Beach Animal Control Shelter. In 1991, a waterfowl "die-off" occurred in a lake at Mount Trashmore State Park. Approximately 50 coots and 25 domestic ducks were collected from the lake. The biologist of this station advised the park interpreter there on collecting and shipping fresh ducks, coots, and gulls to the Madison Health Lab in Wisconsin for analysis. Later that year, results were found to indicate no pathogen, but different causes of death, including *aspergillosis*, shooting, assorted injuries and possible botulism. The most recent disease outbreak

occurred on the Chesapeake Bay in late winter-early spring 1994. The disease affected 347 birds in areas of Back Bay NWR, False Cape State Park, and Sandbridge, including 195 red-throated loons, 48 oldsquaws and other birds. During March 1994, 246 birds were affected in Plum Tree Island NWR, including 206 oldsquaws. It was reported that it was mostly oldsquaw affected by disease, but other birds became affected as well. Avian cholera was suspected and subsequently confirmed. The affected birds were collected and transported to an off-site incinerator at an Animal Control Shelter. No other disease outbreak has been recorded since 1994.

The potential for diseases of waterfowl and other migratory birds is high for Back Bay. Contributing factors including large migratory concentrations and shallow water depths dictate a need for disease contingency planning. Planning objectives include: 1) outlining procedures for early detection and identification of diseases, 2) outlining procedures to minimize mortality from outbreaks, and 3) management of habitat and populations to decrease the likelihood of outbreak.

II. WEATHER DATA

The refuge is located on the northern end of the Outer Banks, with weather conditions tempered from being surrounded by large bodies of water (Atlantic Ocean, Back Bay). Summers are hot, humid and sunny with temperatures exceeding 90°F from May through September. Winters are relatively mild, with snowfall being a rare occurrence. Average winter maximum temperature is 70°F with average minimum of 20°F. Brief cold snaps are common in the winter, causing a temporary freezing of impoundment and bay cove waters. The main waters of Back Bay generally freeze completely for 1-2 weeks.

Extreme range of freeze date: November 13 - April 10
Average freeze date (impoundments and cove): January 10
Average thaw date (impoundments and cove): January 23
Average freeze date (Bay waters): January 16
Average thaw date (Bay waters): January 23

III. MIGRATORY BIRD POPULATION DATA

A. Species and Numbers

Trends in waterfowl abundance are evident when comparing peak populations from 1985-86 to 1997-98 (Figures 1, 2, 3, and 4). Over the past decade, the amount of diving ducks using bay habitat have declined while numbers of dabbling ducks using the impoundments appear to be stable. American coots were the principle species involved in the avian cholera outbreak of 1975, however, the interconnection of the bay and impoundments could potentially spread any infectious agent to species in both habitats.

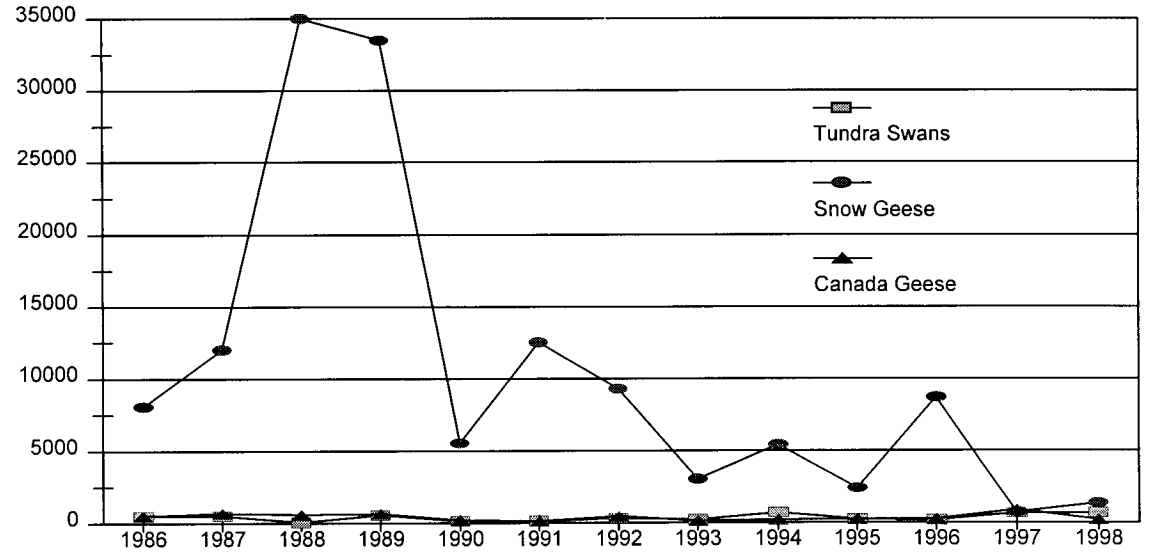


Figure 1. Peak populations of tundra swans, snow geese, and Canada geese observed on Back Bay NWR, Virginia from 1986 through 1998.

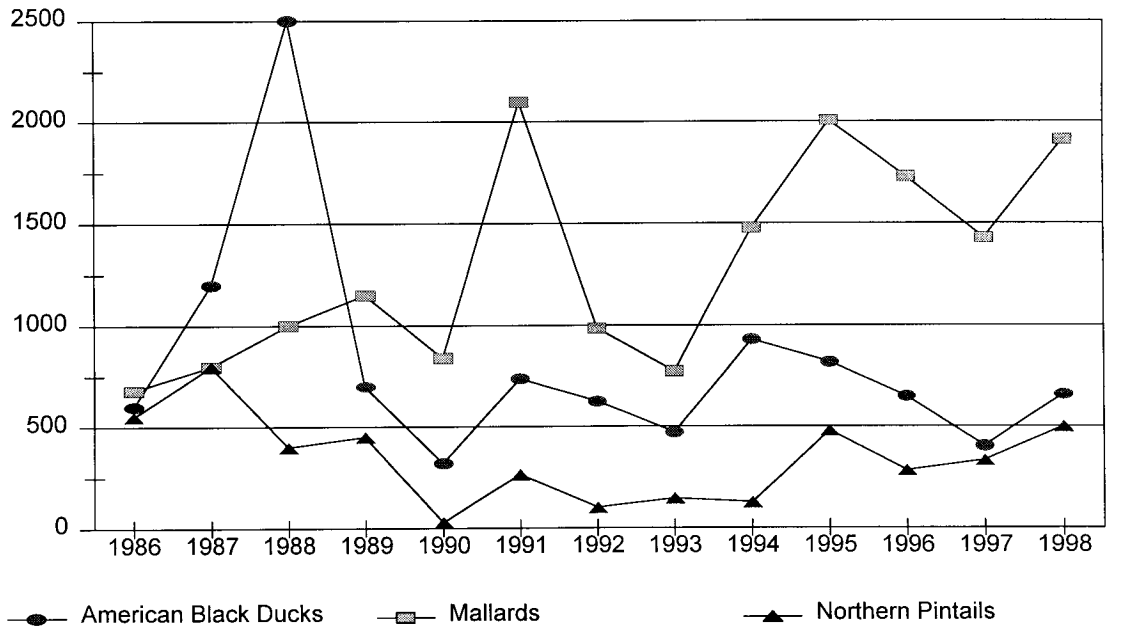


Figure 2. Peak populations of American black ducks, mallards, and northern pintails observed on Back Bay NWR, Virginia from 1986 through 1998.

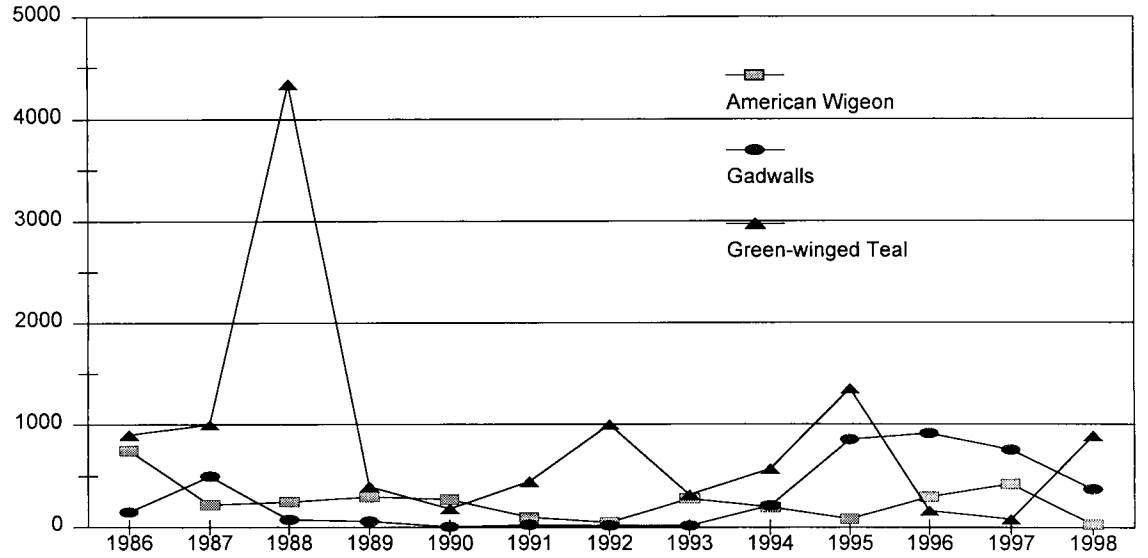


Figure 3. Peak populations of American wigeon, gadwalls, and green-winged teal observed on Back Bay NWR, Virginia from 1986 through 1998.

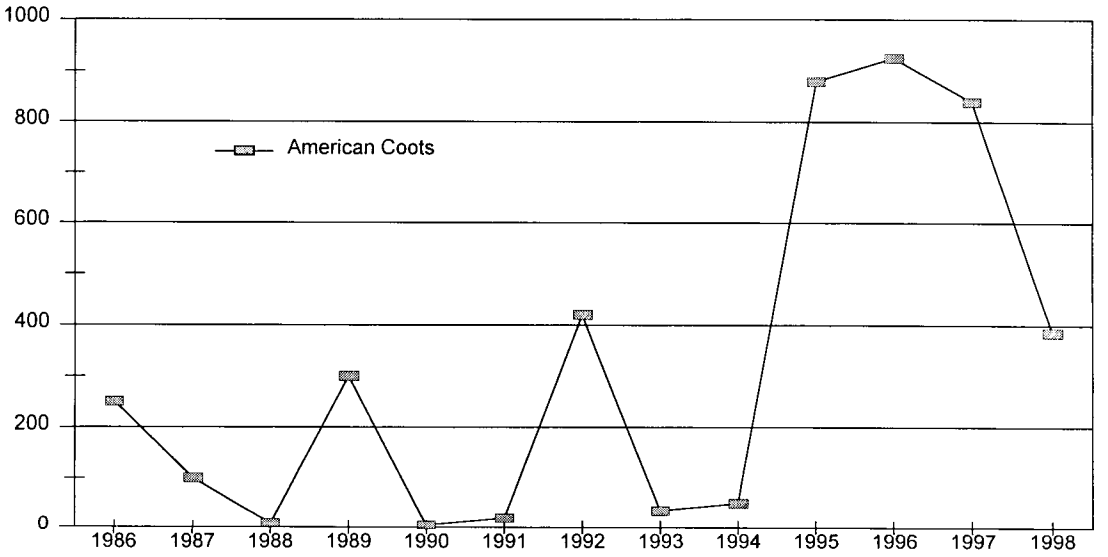


Figure 4. Peak populations of American coots observed on Back Bay NWR, Virginia from 1986 through 1998.

B. Migration Chronology

Majority of the waterfowl species listed in Table 1 winter on the Refuge, with the exception of blue-winged teal (*Anas discors*). The peak period of Refuge waterfowl use appears to be October 15 - March 1. Minimal nesting has been recorded on the Refuge for mallards (*Anas platyrhynchos*), American black ducks (*Anas rubripes*), and wood ducks (*Aix sponsa*).

Table 1. Dates of average arrival and departure, and peak periods for the principle waterfowl species on Back Bay NWR, Virginia.

Species	Period(s) of Refuge Use	Average Peak Population Period
Tundra Swans	November 1 - March 1	December
Snow Geese	October 15 - April 15	January
Canada Geese	October 10 - March 15	November
American Black Ducks	Year-round	January
Gadwalls	November 15 - March 1	December
Mallards	Year-round	January
Northern Pintails	October 1 - March 1	November
American Widgeon	November 15 - March 15	October
Wood Ducks	Year-round	September
Northern Shovelers	November 1 - March 15	February
Blue-winged Teal	August 15 - October 15, March 1 - April 15	September
Green-winged Teal	October 15 - March 1	December
Canvasbacks	November 15 - March 1	December
Redheads	November 15 - March 1	December
Lesser Scaup	November 1 - March 1	November
Ruddy Ducks	November 1 - March 15	November
American Coots	October 20 - April 30	December

C. Migration Routes and Distribution Records

Prior to the division of the Back Bay Refuge Complex, most of the waterfowl banding was conducted on Mackay Island NWR. Low banding effort and success on Back Bay NWR prevents review of banding data specific to this refuge. Additionally, the data from Mackay Island has not recently been condensed nor analyzed.

Tundra Swan (*Cygnus columbianus*): The eastern population nests on the north slope of Alaska and east across arctic Canada to the northeast shore of Hudson Bay and Baffin Island. These birds migrate through prairie and eastern Canada, eastern Montana and the Dakotas to winter along the Atlantic Coast from Maryland to North Carolina.

Tundra Swans stop over in October/November in high concentrations for a period of 1-2 days. During stopover, they concentrate in the bay coves. A few swans generally winter on the refuge with 100-200 birds using "C" and C-Storage impoundments and several hundred or more in the coves around Ragged Island.

Snow Geese (*Chen caerulescens*): They nest principally around northern Foxe Basin, northern Baffin, Bylot, Axel Herberg, and Ellesmere Island and adjacent Greenland. They winter along the mid-Atlantic Coast from southern New Jersey, to Cape Hatteras, North Carolina.

These geese initially occupy small areas of shallow water in the impoundments, gradually extending daily movements to beds of low-growing emergents. By December, "eat outs" of prime foods disperse the geese into smaller flocks scattered between the impoundments, bay coves, and the grassland on Long Island (Appendix Ia).

Canada Geese (*Branta canadensis*): The Atlantic population nests in Newfoundland and Labrador and on the Ungava Peninsula in Quebec, south to the eastern shore of James Bay. These geese winter from New England to South Carolina with a major concentration on the Delmarva Peninsula.

Canada geese wintering on the Refuge and proclamation waters concentrate in the coves of Long Island and Ragged Island (Appendix Ia). Smaller flocks sometimes frequent the Refuge impoundments.

Mallards: Mallards in the Atlantic Flyway, south of Long Island, New York originate from breeding grounds in Ontario. Migration occurs through the lake states to the Chesapeake Bay and south, with over half of the Atlantic population wintering in South Carolina.

The ducks that stopover or winter on the refuge evenly disperse throughout shallow water sections of the impoundments and bay coves. Some nesting does occur on the Refuge in the impoundments.

American Black Ducks: Black duck breeding ranges across the northern tier of states west across the Mississippi River and north through Ontario and northeastern Manitoba to Hudson Bay. Marginal black duck breeding grounds occur on the Refuge with low production in recent years.

Migrating and wintering black ducks on the Refuge tend to occupy the same habitats as mallards and other dabbling ducks. Scattered numbers are evident on the impoundments and bay coves.

American Coots: The northeastern population of coots breed throughout the mid-Atlantic states and New England, north through south Quebec and Ontario. Prior to the outbreak of avian cholera in 1975, the Refuge hosted peaks of 25,000 wintering coots. The coots originally inhabited the bay in large rafts, but current populations are seen primarily in the impoundments. In 1996, coots population had increased to 925. It decreased slightly to 385 in 1998.

IV. RESOURCES AVAILABLE TO COMBAT DISEASE OUTBREAKS

A. Personnel

Permanent staffing on Back Bay NWR includes the following:

Refuge Manager	(1)
Deputy Refuge Manager	(1)
Wildlife Biologists	(2)
Outdoor Recreation Planner	(2)
Park Ranger	(1)
Office Administrator	(1)
Secretary	(1)
Maintenance Supervisor	(1)
Maintenance Mechanic	(1)
Maintenance Worker	(1)
Seasonal SCEP Student	(1)
Seasonal Biological Technicians	(2)

The maintenance workers are capable of operating heavy equipment such as a bull-dozer or front-end loader, while the maintenance, biological, and management staff are capable of operating farm tractors with implements. Heavy equipment could be used to make access possible leading to carcass for vehicles

such as a pickup truck or to construct a burning pit or similar type disposal site.

If a field force larger than permanent staff is required, assistance may be obtained from Service personnel located in nearby Virginia and North Carolina refuges; Wildlife Assistance and ES personnel in Annapolis; and the Virginia Department of Game and Inland Fisheries personnel located in local management areas. Additional assistance could be requested from refuge volunteers and the Cape Henry Audubon Society.

Aerial surveillance could be conducted by Refuge Biologists, or contracted through Mercury Aviation, Suffolk, Virginia; or FWS aircraft could be used by contacting Carl Ferguson at (301) 497-5883.

Adequate lodging and food facilities for temporary personnel is available twenty miles away in Virginia Beach, Virginia. No on-site accommodations are available.

B. Supplies and Equipment

Supplies and equipment available on-site include:

Supplies

Plastic bags (numerous)
Buckets (4)
Rain-gear - parka and pants (4 sets, to be purchased)
Disposable rubber gloves (5 pairs)
12 gauge cracker shells (916 rounds)
Diesel Fuel, Wood (abundant)
Hipboots (8)

Equipment

Pickup Truck (3-4x4 - Cheyenne, Chevrolet Dump, Dodge W-250),
(2-4x2 - Dodge D-250, Electric S-10)
Jeep 4x4 (3 - Chevy Blazer, '91 and'93 Jeep Cherokee)
Allis Chambers 840B Front-end Loader (1)
John Deere 4240 Farm Tractor (1 - with front-end loader)
John Deere 550 Dozer (1)
Ford Tractor 5314 (1)
Ford Backhoe 555B (1)
Forklift (1)
Road raker, diesel (1)

Mack dump truck (1)
23' x 13' plate-metal barge (1)
14' boat with 25 H.P. motor (1 - Go-Devil)
17' boat with100 H.P. motor (1 - Boston Whaler)
16 square feet stern canoe (2), 4 H.P. outboard engine (1)
ATVs (3 - Yamaha, Honda, Suzuki)
John Deere Gator 6x4 (1)
Hand Sprayers (2 - needs to be purchased)
Two-way Radios - Mobile (11), Portables (13)
Drip Torches (2)

Sufficient material is on hand to build burning grates, if needed.

Additional supplies and equipment would be available from the outside sources identified in Section III, A. of USFWS Disease Contingency Plan.

Additional supplies can be purchased from the following area stores:

-Kellam and Eaton Hardware, Virginia Beach - plastic bags, buckets, brushes, disinfectant, gloves, hipboots.

-Lowe's, Holland Road, Virginia Beach - plastic bags, buckets, brushes, disinfectant, gloves, hipboots.

C. Support Facilities

1. Indoor Work Area

The area to be utilized for necropsy and sample processing will be the northern bays of the maintenance shop. Electricity, running water, and heat are all available. The floor can be disinfected at any stage of the operation.

2. Public Relations Facility

The refuge office will be used as an information room during a disease outbreak. Telephones, bulletin boards, and blackboards are all available. The office is about 0.25 miles from the specimen work area, which provides separation but allows for ready access to the contamination area.

3. Daily Briefing Facility

The conference room in the refuge office will serve as a facility for daily

coordinating and briefing meetings.

4. Carcass Disposal Site

The closest off-site incinerator which will accept contaminated material is the Virginia Beach Animal Control Shelter on Leroy Drive, Virginia Beach. The phone number of their facility is (757) 427-4158. If it is not available to our disposal, an on-site burning pit will be an alternative carcass disposal at this Refuge.

V. NOTIFICATION PROCEDURES

A. On-Refuge Disease Problem

In the case of a detected disease problem or actual die-off, the project leader or acting should be immediately notified. The project leader or designated assistant manager should then determine the extent of mortality and report the occurrence to the Disease Control Specialist (DCS) at the National Wildlife Health Laboratory (NHL), Madison, Wisconsin. Concurrently, the Regional Disease Coordinator (RDC) should be contacted, along with the Regional Zone Supervisor (RZS). Managers of all adjacent and nearby management areas should also be notified, to monitor any spreads of the disease. A priority listing of all names and telephone numbers of persons to contact is given on the "Wildlife Disease Notification Chart", Appendix II. This chart will be posted on the office and maintenance shop bulletin boards.

"Report of Disease Problem", Appendix III, will be completed and used as a checklist to ensure that sufficient data is collected prior to reporting an outbreak.

The decisions resulting from NHL and Regional Office (RO) consultation will determine the next course of action. References should be made to the USFWS Migratory Bird Disease Contingency Plan.

B. Disease Problems on Non-Service Lands

When the project leader, or other refuge employee, receives information concerning a disease on non-Service lands, they will immediately notify the individual responsible for administration of those lands, and the DCS and/or RDC (refer to Appendix II for telephone numbers). The DCS or RDC will then consult with the land managing organization and offer assistance as appropriate. Additionally, surveillance should be increased of affected species on any adjacent Refuge lands.

VI. ON-SITE RESPONSE ACTIONS

A. Refuge and Station Closure

If a communicable, serious pathogen is determined or suspected responsible for a disease outbreak, the project leader will close appropriate parts of the refuge. Access to the impoundment area can be closed at the refuge office, however, the bay sections of the refuge are proclamation waters and access cannot be prohibited. If the outbreak is in the bay, the law enforcement personnel will be utilized to notify the boating public and attempt to detour them away from the contaminated area.

Refuge closure is authorized in 50 CFR Section 25.21. The refuge has an ample supply of "Area Closed" signs, and quarantine signs are available from the RDC. The notice of any closure will be coordinated with the RDC or Response Team Leader, with public relations emphasizing the need to minimize spread of the disease through contaminated materials, and to minimize dispersal of infected birds.

B. Initial Preparations

Arrangements for transportation, housing, and other requirements of Response Team personnel will be made by the project leader or assigned assistant manager. At this time, any additional supplies or equipment deemed necessary will be acquired.

Necessary precautions will be made to insure adequate disinfection of clothing, vehicles and equipment used during the disease investigation. If determined necessary by the Resource Team, decontamination of pertinent land and water areas will be initiated.

C. Endangered Species and Habitat

Back Bay hosts the following threatened or endangered animal species: brown pelican (*Pelecanus occidentalis*), peregrine falcon (*Falco peregrinus*), Atlantic loggerhead (*Caretta caretta*), Atlantic green turtle (*Chelonia mydas*) and bald eagle (*Haliaeetus leucocephalus*).

Peregrine falcons and bald eagles (expected to be delisted officially from the endangered species list in July 2000) are presently only migratory visitors of the Refuge, while the pelicans frequent the Refuge beach during the summer. Beached green and loggerhead sea turtle are uncommonly found on the Refuge beach, but only the loggerhead nests on the Refuge.

The Refuge also hosts one plant species, short stemmed lilaeopsis (*Lilaeopsis carolinensis*), which is classified as threatened in Virginia. This plant has been positively identified growing in the northeast section and southeast section of "B" impoundment and in the east side of "A" impoundment (Appendix Ib).

No effect will result to the brown pelican or sea turtles from disease control methods (impoundment drawdown, bird hazing, carcass pickup, etc.). Bald eagles and peregrine falcons, however, scavenge the impoundments and bay shoreline for dead or crippled waterfowl. The danger of their feeding on an infected waterfowl carcass during a disease outbreak is very real. Efficient carcass pickup combined with increased human activity associated with this operation will assist in lessening the chances of this problem, although some hazing could become necessary.

Temporary impoundment drawdowns implemented in a disease outbreak could affect the growth of lilaeopsis. Efforts will be made to limit the length of time "B" impoundment is maintained in a drier state. Also, continuous monitoring will be conducted of the lilaeopsis during such an action.

VII. MANIPULATIONS OF POPULATIONS AND HABITAT

A. Waterfowl Dispersal

1. Consequences of Dispersal

Dispersal of waterfowl in the impoundments usually only causes a shift from one impoundment to the adjacent one. Another common dispersal movement is from the impoundments to Long Island and surrounding Back Bay. Dispersal from "A" impoundment (Appendix Ib) often results in movement to the adjacent impoundments in False Cape State Park. Rarely does dispersal cause complete movement from the immediate Refuge area.

Dispersal of waterfowl inhabiting the Long Island or Back Bay coves generally cause movement to other sections of the bay or to the refuge impoundments. Some movement has been observed to marshes along the western side of the bay, including the Pocahontas-Trojan State Waterfowl Management Area. Occasionally, dispersal will cause extreme southern movement to Currituck Sound and Mackay Island National Wildlife Refuge.

2. Mechanics of Dispersal

Dispersal of waterfowl from Refuge impoundments would be attempted using drawdowns and harassment. Draining all the impoundments to their lowest possible levels, using gates and pumps, would disperse most of the geese, swans and dabbling ducks. This method is slow and would likely not disperse all the birds, leaving some in the dike canals and inland ponds. Repetitious harassment using pyrotechnics, in a manner that would drive the waterfowl either north or south would be a more rapid method but also more labor intensive.

Moving waterfowl from the Back Bay proclamation waters could only be achieved with harassment. Boat traffic and pyrotechnics could be used. Because of the large area involved (more than 3,000 acres), several boats with numerous personnel and volunteers would be required.

3. Materials and Equipment

Sufficient quantities of shot gun and pistol shell crackers are available on-site with Mackay Island NWR potentially acting as an additional source.

Aircraft and pilots are generally available within a day's notice, whether the refuge utilizes FWS pilots (i.e. Carl Ferguson, MD) and service-owned aircraft or contracts through Mercury Aviation. The pilots generally fly from the Chesapeake Municipal or Hampton Roads Airports. A small, private grass strip is also available near the Pocahontas-Trojan State Waterfowl Management Area.

Back Bay watercrafts include one Boston Whaler, one Go-Devil, and one canoe with outboard engine, all of which could be used for dispersal operations. Other area refuges (Mackay Island, Great Dismal Swamp, Cape Charles) would respond with assistance by boat if requested. In addition, the Virginia Department of Game and Inland Fisheries and several Refuge volunteers (members of Coast Guard Auxiliary) would assist upon request.

B. Concentration of Waterfowl

Concentration of waterfowl on the Refuge may be an alternate method to confront disease outbreaks. This method should be used only upon consultation with the RDC or Response Team Leader. The final decision whether to dispose or concentrate the waterfowl will be made by the refuge manager.

Concentration of waterfowl in the impoundments would be accomplished using the same techniques described in the dispersal section of the plan. The draining of specific impoundments combined with the use of hazing techniques would be used to concentrate the birds into a single impoundment or area. Water and food manipulation would be used to hold waterfowl on the Refuge. Hunting and hazing in surrounding areas would also serve to keep birds concentrated.

Aircraft and watercraft would be utilized in the bay to concentrate waterfowl into rafts in open water or into specific coves.

C. Water Control and Food Sources

The Refuge has the capacity to maintain positive water control in all of the impoundments. With the use of water control structures (Appendix Ib) and pumps (1-permanent, 1-crisafulli portable) water could be drawn up or down in the10 impoundments. Additional water sources from the Bay could be affected by wind tide and hinder pumping water into the impoundments. The water level of adjacent impoundments could be altered relative to the levels in the10 impoundments.

If it becomes necessary to discharge water containing pathogens from the impoundment system into the bay, this decision would only be made after discussion and approval from the involved agencies (Virginia Department Game of Game and Inland Fisheries, State Health Departments, U.S. Environmental Protection Agency, Animal and Plant Inspection Service, etc.) (VADEQ)

The time required to discharge or recharge the impoundment system would vary greatly with the bay water levels and the difference in impoundment water levels to be achieved. A minimum of five days of 24-hour pumping would be required to lower the ten impoundments, while over 2 weeks would be required to dramatically increase interior impoundment levels.

Food sources on the Refuge consist only of naturally-occurring crops. Primary foods available in the impoundments include *Leersia oryzoides*, *Scirpus spp.*, *Eleocharis quadrangulata*, *Juncus spp.*, *Bacopa spp.*, *Echinochloa spp.*, *Polygonum spp.*, and *Panicum spp.* There are 256 acres of croplands on the Refuge.

Cultivated cereal grains are readily available from various sources as well as landowners adjacent to the Refuge. However, artificial feeding is not recommended as a practice during a disease outbreak. Artificially increasing bird concentrations also tends to increase the risk of disease spread and would be used only as a last alternative, if prescribed by the DCS or RDC and the project leader.

D. Waterfowl Depopulation

1. Materials and Equipment

In the event of an outbreak that warrants depopulation procedures, the following materials would be acquired (if not already on station):

Hand held crab nets (10)
113.6 liter capacity plastic garbage cans (5)
Carbon Dioxide fire extinguishers (5)
Rubbing Alcohol (2 gallons)
Fuel Oil (for burning)

Other equipment necessary would include:

Large, shallow-drafted barge
Flat bottom jon (10') with 4 HP motor
Boston Whaler (17') with 100 HP motor
Helicopter or Cessna High-wing Plane (C-152 or C-172)
Burning Pit(s)
Drip Torches

All of the boats and the aircraft would need to be equipped with two-way radios.

2. Methods

The following methods are condensed from Control of a Fowl Cholera Outbreak Among Coots in Virginia, D. F. Holland, F. H. Settle and D. C. Gnegy, published in proceedings of the 30th Annual Meeting of the Association of Game and Fish Commission,1976. This publication was based on methods used to combat the avian cholera outbreak on Back Bay in 1975.

If the outbreak is located in the bay, the diseased waterfowl would be herded into rafts or coves, with the use of boats and aircraft. Herding would not usually be necessary in the impoundments. After the diseased birds are concentrated into rafts or groups, aerial spraying of the PA-14 wetting compound would commence. Adequate coverage has been demonstrated from test flights undertaken at 50 feet altitude and at an air speed of 62 miles per hour. A wing-mounted spray boom would be used from a high-winged aircraft.

After the birds are rendered flightless, they would be scooped up with hand held crab nets by personnel on boats. A barge would be used to transport birds collected from the water, and to store spare equipment. Euthanizing would be conducted using double strength plastic garbage bags and carbon dioxide fire extinguishers. Dead birds would then be transported to off-site incinerator at Virginia Beach Animal Control Center on Leroy Drive or, if needed, to an on-site burning pit (Appendix Ib).

If an on-site burning pit needs to be made, the depth would be limited to 5-7 feet due to the high water table. Iron gratings placed on cinder blocks would be placed on the bottom to facilitate burning. Fuel oil and drip torches would be used to ignite the pit. After burning, the pit would be covered, and the surface contoured to prevent erosion.

The use of a helicopter would rely on the discretion of the project leader and RDC or DCS. Helicopters were used in the avian cholera outbreak to locate birds and herd them into tight configurations.

Following the elimination of the infected birds, efforts would be directed toward keeping healthy waterfowl out of the outbreak areas. Personnel equipped with pyrotechnics combined with use of aircraft would be utilized for harassment. Additionally, unaffected areas of marshland would be burned to draw birds away from the other outbreak area. Intensive surveillance and hazing would be continued for a minimum of 10 days following any depopulation.

VIII. MONITORING AND DISEASE PREVENTION

Due to this Refuge's history of a major disease outbreak, early detection is the best method of prevention. All waterfowl mortality should be investigated even if only a few specimens are found. In the event that diseased or dead birds are discovered, a thorough search of the Refuge including impoundment and bay transects would be conducted to determine the extent of the outbreak. An attempt would be made to capture any diseased, but still alive, birds and hold them until the DCS is contacted. Field notes would include the numbers of sick or dead birds, behavior and movements of affected birds, the number of birds at risk, the species affected, any clinical signs observed and any other circumstances surrounding the die-off. This information is outlined on the form, Report of a Disease Problem (Appendix III).

In instances of bacterial or fungal infections, it may prove necessary to drawdown and burn the impoundments between peak waterfowl-use periods. In other cases, biological indicators such as predators or invertebrates can be used to detect potential disease and contaminant problems.

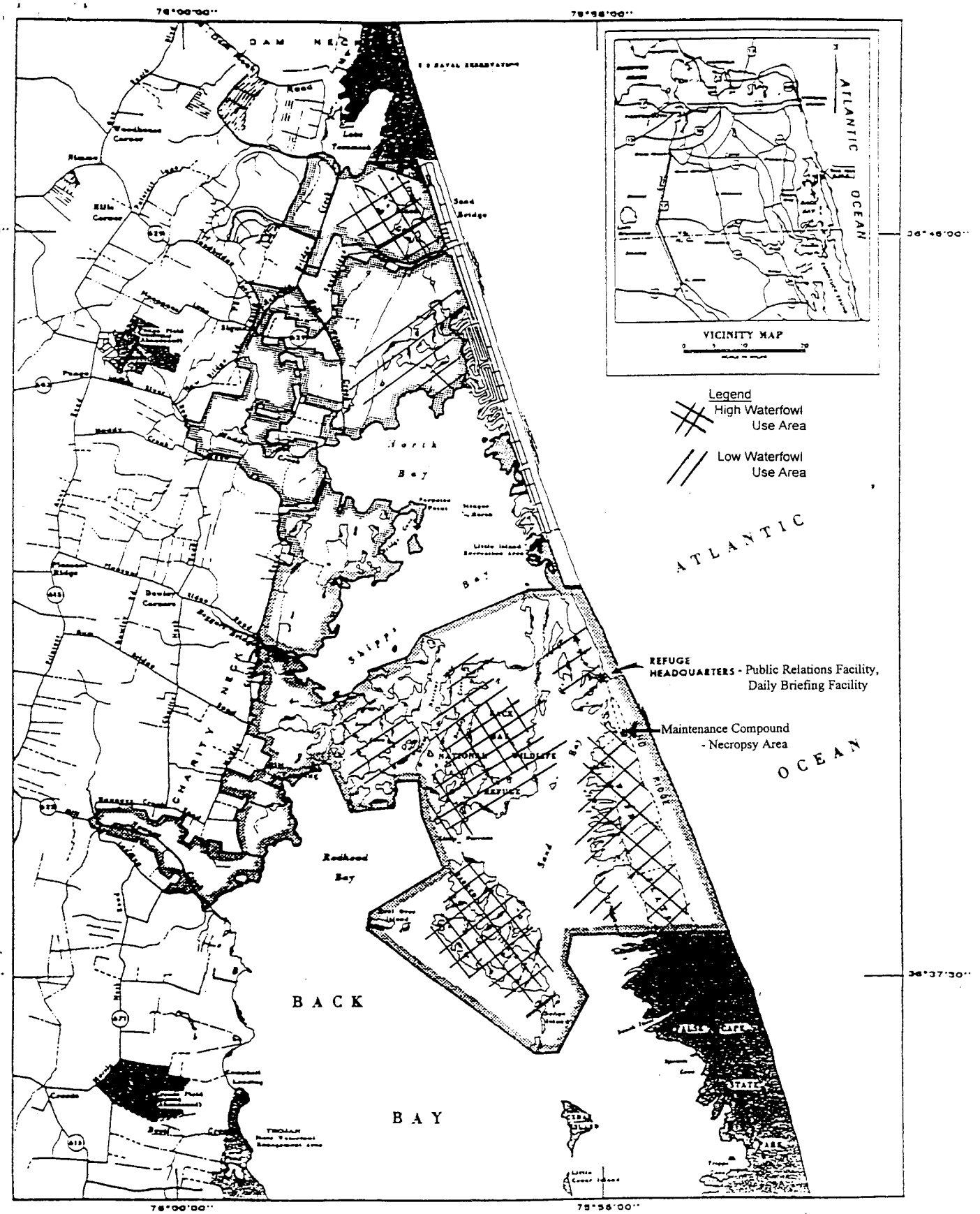
Appendix Ia

BACK BAY NATIONAL WILDLIFE REFUGE

UNITED STATES DEPARTMENT OF THE INTERIOR

CITY OF VIRGINIA BEACH, VIRGINIA

UNITED STATES FISH AND WILDLIFE SERVICE



COMPILED IN THE DIVISION OF REALTY FROM SURVEYS BY U.S.G.S. AND U.S.F.&W.S

NEWTON CORNER MASSACHUSETTS April 1989
REVISED: MARCH 1990

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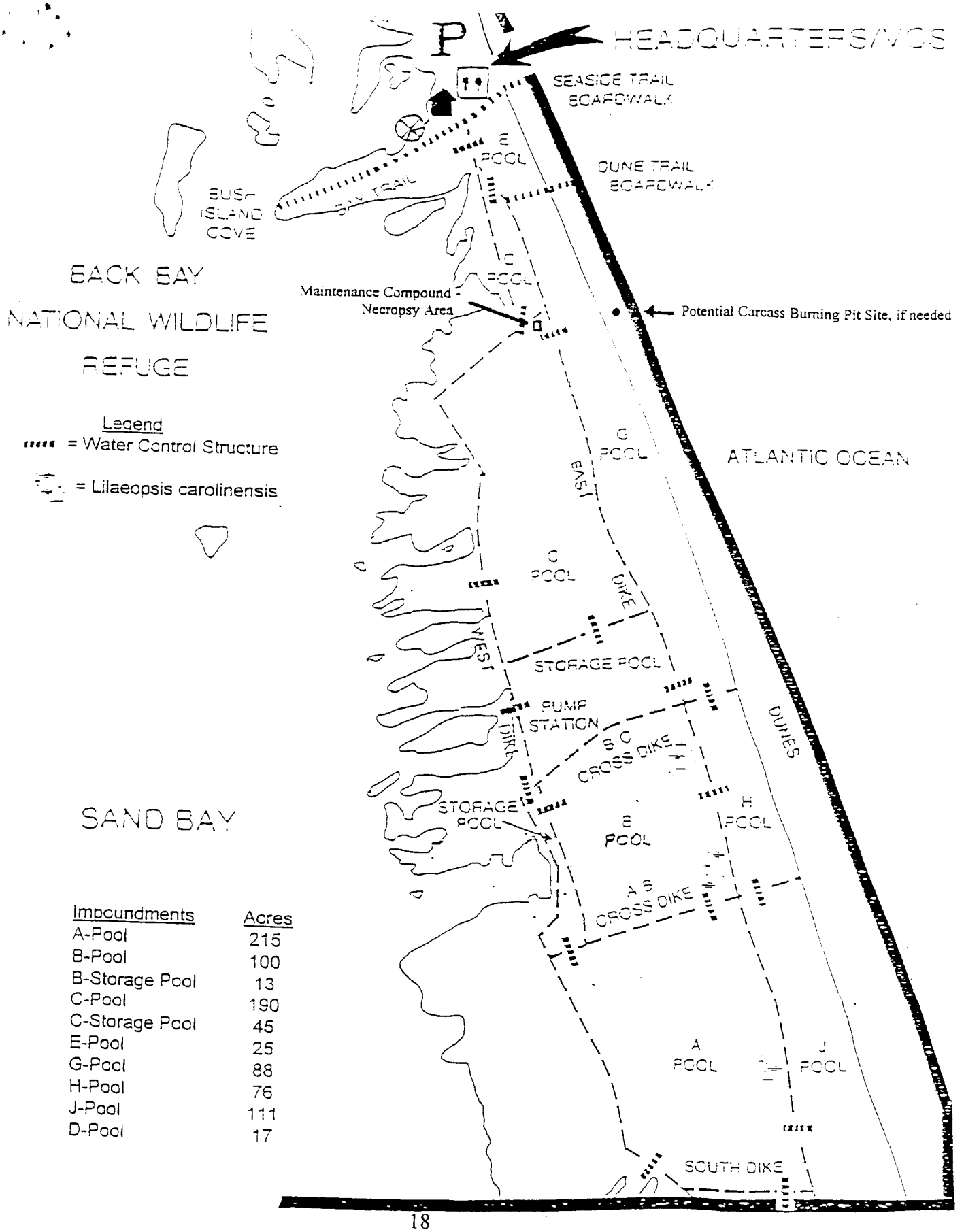
Appendix Ib



Impoundments	Acres
A-Pool	215
B-Pool	100
B-Storage Pool	13
C-Pool	190
C-Storage Pool	45
E-Pool	25
G-Pool	88
H-Pool	76
J-Pool	111
D-Pool	17

APPENDIX II

Wildlife Disease Notification Chart

(To be filled out and posted in office)

Refuge or Station Name: Back Bay National Wildlife Refuge

Refuge Manager: John P. Stasko

Deputy Refuge Manager: Paul Caldwell

In the event of a disease outbreak, notify:

1. Disease Control Specialist:

Cathy Converse	NWHL (Madison, WI)	1-608-270-2446
NAME	LOCATION	PHONE NUMBER
Linda Glaser	NWHL (Madison, WI)	1-608-270-2445
NAME	LOCATION	PHONE NUMBER

OR if DCS not reachable, call:

Regional Senior Biologist

Jay Hestbeck	Hadley, MA	1-413-253-8527
NAME	LOCATION	PHONE NUMBER

Migratory Bird Coordinator

George Haas	Hadley, MA	1-413-253-8576
NAME	LOCATION	PHONE NUMBER

2. Immediate Supervisor and/or designated Regional Office, contact:

Tom Goettel	Regional Office	1-413-253-8517
NAME	LOCATION	PHONE NUMBER

3. Biologist-in-charge of nearby management areas:

Pocahontas-Trojan WMS	VA Beach	757-426-6320/2739
NAME	LOCATION	PHONE NUMBER
False Cape State Park	VA Beach	757-426-7128/3657
NAME	LOCATION	PHONE NUMBER

4. Service Special Agent:

Donald R. Patterson	Richmond, VA	1-804-771-2883
NAME	LOCATION	PHONE NUMBER

Special Reminder: Are Endangered Species in, or likely to arrive in, the disease outbreak area? Endangered Species permits or Section 7 consultation may be required: consult page 9 in Migratory Bird Disease Contingency Plan for procedures and your Station Disease Contingency Plan for list of Endangered Species.

5. Adjacent State or Federal Management Areas:

False Cape State Park	Kyle Barber ~~Barber~~ OAR	1-757-426-7128 day 1-757-426-3657 night
NAME	CONTACT	TELEPHONE NO.
Mackay Island NWR	Susanne Baird	1-757-429-3100 day
NAME	CONTACT	TELEPHONE NO.
Eastern Shore of VA NWR	Susan Rice	1-757-331-2760 day
NAME	CONTACT	TELEPHONE NO.
Great Dismal Swamp NWR	Lloyd Culp	1-757-986-3705 day
NAME	CONTACT	TELEPHONE NO.
Alligator River NWR	John Taylor	1-919-473-1131 day
NAME	CONTACT	TELEPHONE NO.
Pocahontas-Trojan WMA	Lionel Ewing	1-757-426-6320 day
NAME	CONTACT	TELEPHONE NO.

APPENDIX III

Report of Disease Problem

While this report is to be completed by individuals at National Wildlife Health Laboratory when receiving initial reports of mortality, Service personnel should use this as a checklist to ensure that they have as much of the information as possible when reporting the die-off.

1. Location of the problem:
   (a) State
   (b) County
   (c) NWR, if any
   (d) Nearest town
   (e) Nearest commercial airport
   (f) Other (Name of lake or river, or State or Federal wildlife areas).

2. Identification of informant or contact:
   (a) Name
   (b) Title
   (c) Organization
   (d) Telephone number
   (e) Address

3. Species involved in the problem (be as specific as possible, i.e., mallards and Canada geese rather than ducks and geese):

4. Estimated losses to date (by species, if known):

5. Estimated population(s) at risk (by species, if known):

6. Identification of any rare and endangered species, or other critical species on the problem area (Indicate Unknown if not known or None if there are none):

7. Date of onset of problem if known or best estimate if unknown (indicate estimated dates):

8. Other laboratories involved in investigation of the problem (indicate None or Unknown as appropriate):
   (a) Name of laboratory
   (b) Name of contact within laboratory
   (c) Telephone number of laboratory (if FTS, indicate)

9. Findings of other laboratories if known (indicate None or Unknown as appropriate):

10. Other individuals notified of the problem by the informant or contact:
    (a) Names
    (b) Organizations
    (c) Telephone numbers if known

11. Assistance requested of the NWHL:
    (a) Diagnostic specimens being sent to NWHL (specify type)

    (b) Tissues being sent for assay (specify type of assay)

    (c) Advice requested for control of problem

    (d) Other (specify)

12. Additional pertinent information, including behavior of sick and dying birds, and signs of bleeding, physical injury, or discharge around vent:

13. Date and time contact was established with NWHL:

14. Name of individual receiving contact:

15. Method of contact (check as appropriate):
    (a) Telephone
    (b) Letter
    (c) Other (specify)

16. Instructions provided to the caller:

17. Date and time RDC contacted and type of assistance requested.:

18. Date of this report: